Transcript for Earthzine Video

Mayisha:

Good day everyone! I'm Mayisha Zeb Nakib. A NASA DEVELOP team at Stennis Space Center is studying the feasibility of using NASA Earth Observation Satellites to monitor the impact of severe weather phenomena on wheat crops and improve crop assessment. Here today, we have the Oklahoma Agriculture team who's going to tell us more about their project this term!

Shelby:

Hi I'm Shelby Barrett and I'm the team lead for the OK Ag team this term. I'm currently a sophomore at William Carey University.

Hunter:

Hi I'm Hunter Starring and I attend Louisiana State University

Virginia:

Hi I'm Virginia Thomas and I just graduated from Mississippi State University

Cody:

Hi I'm Cody Dockins and I'm a senior at the University of New Orleans

Hunter:

This study focuses on the Hard Red Winter Wheat crop in Oklahoma from 2009-2012. Wheat is such a large part of the economy in Oklahoma. Wheat harvests in 2011 brought in over 500 million dollars in Oklahoma. And because Oklahoma is located in essentially the heart of "tornado alley", these crops often suffer severe damage due to extreme weather phenomena such as hail, tornados, and even drought. We observed seven counties in central and western Oklahoma including: Caddo, Canadian, Cleveland, Custer, Kingfisher, Tillman, and Washita county. These counties were chosen because they produced nearly half of all the wheat for Oklahoma in 2011. We intend to provide our partner at the USDA National Agricultural Statistics Service with a methodology for analyzing this damage that can be easily replicated. As well as show the potential of these MODIS NDVI phenology products to be useful in future disaster management.

Shelby:

We're utilizing NASA EOS to monitor the impacts of severe weather phenomena on wheat crops, more specifically, MODIS NDVI products, and MODIS NDVI phenology products. NDVI is a vegetation index that shows the health of the vegetation. Our science advisor, Joe Spruce with CSC, here at Stennis, provided us with all of our MODIS NDVI products. We created two kinds of change detection maps. First, we compared the maximum NDVI for wheat fields in our study area from one year to the next. For example, by comparing the growing seasons for 2009 and 2010, we were able to see the change in NDVI *[Show and discuss picture of change detection].* Warm colors, such as red and orange display negative change in vegetation, whereas the cooler colors such as blue, display positive changes. The second kind of change detection we produced used intra-seasonal NDVI to compare changes in NDVI between 24-day periods within a single growing season *[Show and discuss picture of intra-seasonal NDVI models].* We used MODIS NDVI phenology products along with a cropland data layer from the National Agricultural Statistics Service to plot out the growing seasons of wheat for Custer, Washita, and Kingfisher County. We also used this phenology data to perform more in depth change detections with the anticipation of pinpointing anomalies due to certain weather events within the growing season.

Virginia:

When analyzing our year-to-year change detection maps, we were not able to detect tornado paths through wheat due to the extreme drought that occurred in 2011 that compromised the health of the crops and lowered NDVI values. Wheat is also a cyclic crop. Therefore, there was no way to know if the extreme change detected in years other than 2011 was due to weather damage, or the area of comparison being bare. We were however able to detect the damage of two EF4 tornadoes that occurred on May 10, 2010 in Cleveland County Oklahoma, which is mostly deciduous forest and urban area. These two tornadoes spanned over 880 yards wide and had a path of over 20 miles long, making them easier to detect.

The intra-seasonal change detection maps also clearly showed the paths of these two tornadoes in 2010. However, we were once again unable to detect damage in wheat fields caused by tornadoes.

Phenology change detection maps, which had wheat masked out, did not make visible any tornado damage done to wheat crops. We were successful in using these phenology products to map out the growing season of wheat crops.

Cody:

Though we were able to distinguish tornado paths in both the year-to-year and the intra-seasonal change detection maps, because of the large size of MODIS pixels, it was not possible to observe damage caused by tornadoes less than 880 yards wide. The tornado damage we were able to detect occurred mostly over deciduous forest and urban areas, passing over little wheat. The extreme drought that occurred in 2011 caused severe damage to wheat crops in Oklahoma and hindered any detection of tornado damage that might have been visible in the year-to-year change detection maps.

In conclusion, year-to-year MODIS NDVI detection maps best displayed drought stress to wheat crops. Within the study area and time frame, intra-seasonal NDVI detection maps were most useful for observing damage caused by large tornadoes. The NDVI phenology products proved to be of little use for detecting tornado damage in this particular study, but they clearly showed overall change to wheat within the study area. The phenology products were, however, used to successfully plot out the growing season for wheat crops. By providing a methodology for mapping out the growing seasons of wheat, farmers can gain a better understanding of their crops to improve farming methods.

Mayisha: Well that’s all the time we have for today! Thank you for watching!